

AQA Qualifications

LEVEL 3 Certificate

Mathematical Studies

Mark scheme

Paper 2B
1350/2B

Version 1.0

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

Principal Examiners have prepared these mark schemes for practice papers. These mark schemes have not, therefore, been through the normal process of standardising that would take place for live papers.

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Glossary for Mark Schemes

Examinations are marked in such a way as to award positive achievement wherever possible. Thus, for mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

M	mark is for method
dM	mark is dependent on one or more M marks and is for method
A	mark is dependent on M or m marks and is for accuracy
B	mark is independent of M or m marks and is for method and accuracy
E	mark is for explanation
ft	follow through from previous incorrect result
CAO	correct answer only
CSO	correct solution only
AWFW	anything which falls within
AWRT	anything which rounds to
ACF	any correct form
AG	answer given
SC	special case
OE	or equivalent
A2,1	2 or 1 (or 0) accuracy marks
PI	possibly implied
SCA	substantially correct approach
c	candidate
sf	significant figure(s)
dp	decimal place(s)

Q	Answer	Mark	Comments
1 (a)	25	B1	
1 (b)	<p>Error</p> <p>Question 1 is repeated in the 3rd column/3rd column has been mislabelled</p> <p>or</p> <p>Mode is in the same column as student/some will assume mode is a name of a student in the class</p>	E1	oe statement
	<p>Improvements</p> <p>Arrange list in alphabetical or numerical order/ list in ascending/descending order</p> <p>Remove 'Mode' from the last row/change 'Mode' to 'Modal mark'</p> <p>Use 'mean' instead of mode if he wants to analyse the overall performance of these four students</p> <p>Remove the repeated Question 1 heading and replace with Question 2</p> <p>Move "Student" to a new column to the left of the names</p> <p>Add total possible mark for each question</p> <p>Add total possible mark in 'Total mark' heading</p>	E3	<p>oe statements</p> <p>E1 for each valid improvement</p> <p>Ignore any incorrect suggestions</p>

Q	Answer	Mark	Comments
1 (c)	<p>Richard's statement</p> <p>Cannot possibly use this as the maximum mark for Question 1 is not known or the maximum mark could be anything from 3 to 6</p> <p>or</p> <p>Assuming the maximum mark for question 1 is three or four, the statement is correct</p>	E1	oe statement
	<p>Din's statement</p> <p>$(64 + 72 + 40 + 68 + 64) \div 5$</p> <p>or</p> <p>$308 \div 5$</p>	M1	Working out the mean
	61.6(%) or 62(%)	A1	
	<p>Din is wrong/ His statement is incorrect/It should be 61.6(%) or 62(%)</p> <p>or</p> <p>Din is right in that it is 60(%) to the nearest 10(%) /to 1 sf</p>	E1ft	<p>oe correct statement</p> <p>ft correct statement for their mean if M1A0 scored</p>

Q	Answer	Mark	Comments
2 (a)	<p>There are no keys to indicate the meanings of abbreviations used (eg Q1/Q4/DTV/ISDN etc)</p> <p>Some data is only for adults/has no data shown for teenagers</p> <p>The number of active 4G mobile subscriptions for 2014 is shown as >6 million (Q1 2014), but this is a range of values/no definite number is shown</p> <p>Some data does not represent the whole year/some is only shown up to May 2014</p> <p>The data for the percentage of premises covered by outdoor 4G in 2013 is missing</p> <p>The two columns are for 2013 and 2014, but in the data some is showing 2012 and 2013/the previous year's figure</p> <p>The percentages of the market shares of fixed broadband providers in the UK in 2014 do not total 100/the percentages of the market shares of fixed line providers in the UK in 2013 do not total 100</p> <p>The method of calculation of availability of superfast broadband appears to have changed between 2013 and 2014</p>	E3	<p>oe examples</p> <p>E1 for each correct example up to E3</p> <p>Ignore incorrect examples</p>

Q	Answer	Mark	Comments
2 (b)	It should be 31.4 (instead of 31.24)/24 minutes = 0.4 hours not 0.24 hours Christopher should divide by 365 (instead of 355) The final answer should 1.03... hours (instead of 1.06) The data was only for one month in 2013, so you can't use it for the whole of the year	E3	oe statements E1 for each correct statement up to E3 Ignore incorrect statements

Q	Answer	Mark	Comments
2 (c)	<i>Rasheed's claim</i>		
	$\frac{3}{5} \times 3.9$ or 2.34 (m) or $\frac{8}{5} \times 3.9$ or 6.24 (million) or $6.1 \div 3.9$ or 1.56... or $(6.1 - 3.9) \div 3.9$ or $2.2 \div 3.9$ or 0.56...	M1	
	6.24 (million) and No or 1.56... and No	A1	Correct evaluation of the number of connections needed for the scale factor given or of the actual scale factor
	<i>Francoise's claim</i>		
	33200000×0.379 or 12582800 or 33400000×0.376 or 12558400 or 24400	M1	Allow digits 125828 or 125584
	24 400 and Yes	A1	
	<i>Eugene's claim</i>		
	It is not possible to check/tell/confirm Eugene's statement as the data does not cover an entire year of 2014. or He might be right if the declining trend follows throughout the year or The decline might have happened during the rest of 2013	E1	oe statement

Q	Answer	Mark	Comments
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3(a)	600 x 0.04	M1	oe
	24	A1	
	600 – (144 + 195 + their 24)	M1	oe
	237	A1	

3(b)	Their 24 used as a numerator or their 144 + 24 or 168 seen	M1	
	$\frac{24}{168}$ or $\frac{1}{7}$ or 0.14(285..)	A1	oe A decimal answer must be to at least 2 dp
	Additional Guidance		
	24 divided by any number gets M1	M1	

Q	Answer	Mark	Comments
4(a)	Alternative method 1		
	0.3×0.3 or 0.09 or 0.45×0.45 or 0.2025 or 0.25×0.25 or 0.0625	M1	Probability of getting the same type of card found for one type of card
	0.3×0.3 or 0.09 and 0.45×0.45 or 0.2025 and 0.25×0.25 or 0.0625	M1	Probabilities of getting the same type of card found for all 3 types of card
	Their 0.09 + their 0.2025 + their 0.0625 or 0.355	M1dep	Evidence of adding the probabilities for the 3 different types of card Dependent on M1M1
	1 – their 0.355	M1dep	Dependent on M1M1M1
	0.645 or $\frac{129}{200}$	A1	oe fraction, decimal or percentage
	Alternative method 2		
	0.3×0.45 or 0.135 or 0.3×0.25 or 0.075 or 0.45×0.25 or 0.1125	M1	Probability of getting different types of card found for one pair
	0.3×0.45 or 0.135 and 0.3×0.25 or 0.075 and 0.45×0.25 or 0.1125	M1	Probability of getting different types of card found for all pairs
	2 × their 0.135 or 0.27 or	M1dep	Doubling each probability of a different pair or

	<p>2 × their 0.075 or 0.15 or 2 × their 0.1125 or 0.225 or their 0.135 + their 0.075 + their 0.1125 or 0.3225</p>		<p>Adding the individual probabilities of getting a different pair Dependent on M1M1</p>
	<p>Their 0.27 + their 0.15 + their 0.225 or their 0.3225 × 2</p>	<p>M1dep</p>	<p>Adding all the probabilities of getting a different pair or doubling their addition The total must be between 0 and 1 Dependent on M1M1M1</p>
	<p>0.645</p>	<p>A1</p>	
Additional Guidance			
<p>All products seen (eg on a tree diagram) with no further work gets M1M1M0M0A0</p>			

Q	Answer	Mark	Comments
4(b)	80 × 0.3 or 24 or 80 × 0.45 or 36	M1	
	Their 24 × 0.625 or 15 or their 36 × 0.75 or 27	M1	
	Their 15 × 5 or 75 or their 27 × 8 or 216	M1dep	Dependent on M1M1
	Their 75 + their 216	M1dep	Dependent on M1M1
	291	A1	

Q	Answer	Mark	Comments
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5(a)			
	Network of at least 5 activities and some arcs with A, B, C correctly linked.	B1	
	Tasks B and C only immediately preceding task D.	M1	
	Activity network correct	A1	
	Start times correct at E and D	M1	
	All start times correct	A1	
	Finish times correct at F and G	M1	Allow follow through from their total finish time
	Finish time correct at B	A1	
All finish times correct	A1		

5(b)	B	B1	
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5(c)	A C D F I	B1	
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Q	Answer	Mark	Comments
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5(d)			
	At least 4 activities with labelling and attempt at timescale	M1	Accept bars without floats
	At least 5 tasks plotted, labelled and with correct start times	M1	Allow follow through from 5(a)
	At least 2 correct floats seen	M1dep	Dependent on first method mark
	All correct including timescale evenly spaced and units labelled	A1	Tasks A, C, D, F and I may be drawn together on one line
	Additional Guidance		
	Scale on x -axis may differ but must be evenly spaced		
	Must have time on one axis and activities on the other for 1 st M1		

Q	Answer	Mark	Comments
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6(a)	$0.1 \times 6\,000\,000$ or 600 000 seen	M1	
	Their $600\,000 \times 0.65$	M1	
	£390 000	A1	Must include units

6(b)	Alternative method 1		
	$600\,000 \times 0.3$ or 180 000	M1	Or their (10% of £6 000 000) $\times 0.3$
	Their $180\,000 + 120\,000$ or 300 000	M1	Adding cost of implementing reorganisation
	$600\,000 \times 0.16$ or 96 000	M1	Or their (10% of £6 000 000) $\times 0.16$
	Their $96\,000 + 185\,000$ or 281 000	M1	Adding cost of implementing IT upgrade
	£300 000 and £281 000	A1	Must include units
	Recommends IT Upgrade	E1ft	ft correct decision for their values
	Costs less overall/reduces the risk by the highest amount	E1ft	ft justification for their decision
	Alternative method 2		
	$0.3 - 0.16$ or 0.14	M1	Difference in expected penalty
	$600\,000 \times 0.14$	M1	Or their (10% of £6 000 000) $\times 0.14$
	£84 000	A1	
	$185\,000 - 120\,000$ or 65 000	M1	Difference in implementing costs
	Comparing £84 000 saved in penalty against extra £65 000 costs.	M1	Must include units
	Recommends IT Upgrade	E1ft	ft correct decision for their values
Costs less overall/reduces the risk by the highest amount	E1ft	ft justification for their decision	

Alternative method 3		
600 000 × 0.35 or 210 000	M1	Or their (10% of £6 000 000) × 0.35
Their 210 000 – 120 000 or 90 000	M1	Saving from implementing reorganisation
600 000 × 0.49 or 294 000	M1	Or their (10% of £6 000 000) × 0.49
Their 294 000 – 185 000 or 109 000	M1	Saving from implementing IT upgrade
Comparing £109 000 and £90 000	A1	Must include units
Recommends IT Upgrade	E1ft	ft correct decision for their values
Costs less overall, reduces the risk by the highest amount	E1ft	ft justification for their decision